

WHAT IS CLAIMED IS:

1. A backlight inverter for a liquid crystal display (LCD) panel for driving a plurality of lamps in pairs,  
5 comprising:

a main driving integrated circuit (IC) for generating first and second pulse width modulation (PWM) pulses in response to a dimming voltage based on a brightness control and an internally generated PWM oscillation signal, delaying  
10 the generated first and second PWM pulses by a predetermined period of time and outputting first and second PWM drive signals on the basis of the delayed first and second PWM pulses, respectively;

at least one sub-driving IC for secondarily delaying  
15 said delayed first and second PWM pulses from said main driving IC by said predetermined period of time and outputting third and fourth PWM drive signals on the basis of the secondarily delayed first and second PWM pulses, respectively;  
and

20 a plurality of lamp operating circuits for operating said pairs of lamps in response to said first and second PWM drive signals from said main driving IC and said third and fourth PWM drive signals from said sub-driving IC, respectively.

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2. The backlight inverter as set forth in claim 1,  
wherein said lamp operating circuits each include:

a pair of power switches for converting a direct current  
(DC) voltage into square-wave voltages in response to said  
5 first and second PWM drive signals from said main driving IC  
or said third and fourth PWM drive signals from said sub-  
driving IC, respectively;

a pair of converters for rectifying the square-wave  
voltages from said power switches, respectively;

10 a pair of transformer oscillators for converting output  
voltages from said converters into alternating current (AC)  
voltages and outputting the converted AC voltages to a  
corresponding one of said pairs of lamps, respectively; and

a pair of lamp voltage detectors for detecting voltages  
15 resulting from currents flowing through the corresponding pair  
of lamps, respectively.

3. The backlight inverter as set forth in claim 1,  
wherein said main driving IC includes:

20 a shift oscillation controller for generating said first  
and second PWM pulses in response to said dimming voltage and  
PWM oscillation signal;

a shift oscillation time controller for delaying said  
first and second PWM pulses from said shift oscillation  
25 controller by said predetermined period of time and outputting

the delayed first and second PWM pulses internally, and externally to said sub-driving IC;

a comparison circuit for comparing said delayed first and second PWM pulses from said shift oscillation time controller with predetermined reference signals to adjust duty ratios of the reference signals according to said delayed first and second PWM pulses, respectively; and

first and second output drivers for generating said first and second PWM drive signals in response to output PWM pulses from said comparison circuit, respectively, and outputting the generated first and second PWM drive signals to a corresponding one of said lamp operating circuits.

4. The backlight inverter as set forth in claim 1, wherein said sub-driving IC includes:

a shift oscillation time controller for secondarily delaying said delayed first and second PWM pulses from said main driving IC by said predetermined period of time and outputting the secondarily delayed first and second PWM pulses internally, and externally to a subsequent sub-driving IC;

a comparison circuit for comparing said secondarily delayed first and second PWM pulses from said shift oscillation time controller with predetermined reference signals to adjust duty ratios of the reference signals according to said secondarily delayed first and second PWM

pulses, respectively; and

first and second output drivers for generating said third and fourth PWM drive signals in response to output PWM pulses from said comparison circuit, respectively, and  
5 outputting the generated third and fourth PWM drive signals to a corresponding one of said lamp operating circuits.

5. The backlight inverter as set forth in claim 3, wherein said shift oscillation controller includes:

10 a PWM oscillator for generating a sawtooth-wave pulse of a predetermined frequency as said PWM oscillation signal;

a first comparator for comparing said sawtooth-wave pulse from said PWM oscillator with said dimming voltage and outputting said first PWM pulse as a result of the comparison;

15 an inverter circuit for inverting said dimming voltage about a predetermined reference voltage; and

a second comparator for comparing said sawtooth-wave pulse from said PWM oscillator with the inverted dimming voltage from said inverter circuit and outputting said second  
20 PWM pulse as a result of the comparison.

6. The backlight inverter as set forth in claim 3, wherein said shift oscillation time controller in said main driving IC includes:

25 a first delay for delaying said first PWM pulse from

said shift oscillation controller by said predetermined time period; and

a second delay for delaying said second PWM pulse from said shift oscillation controller by said predetermined time  
5 period.

7. The backlight inverter as set forth in claim 3, wherein said shift oscillation time controller includes a plurality of delay time setting capacitors connected  
10 respectively to external terminals thereof.

8. The backlight inverter as set forth in claim 6, wherein said shift oscillation time controller in said main driving IC further includes:

15 a first output comparator for comparing an output signal from said first delay with a reference voltage and outputting said delayed first PWM pulse as a result of the comparison; and

a second output comparator for comparing an output  
20 signal from said second delay with said reference voltage and outputting said delayed second PWM pulse as a result of the comparison.

9. The backlight inverter as set forth in claim 4,  
25 wherein said shift oscillation time controller in said sub-

driving IC includes:

a first delay for secondarily delaying said delayed first PWM pulse from said main driving IC by said predetermined time period; and

5 a second delay for secondarily delaying said delayed second PWM pulse from said main driving IC by said predetermined time period.

10 10. The backlight inverter as set forth in claim 4, wherein said shift oscillation time controller includes a plurality of delay time setting capacitors connected respectively to external terminals thereof.

15 11. The backlight inverter as set forth in claim 9, wherein said shift oscillation time controller in said sub-driving IC further includes:

a first output comparator for comparing an output signal from said first delay with a reference voltage and outputting said secondarily delayed first PWM pulse as a result of the  
20 comparison; and

a second output comparator for comparing an output signal from said second delay with said reference voltage and outputting said secondarily delayed second PWM pulse as a result of the comparison.

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